Estuarine and Marine Habitats:

(32) Oligohaline Estuaries (including Tidal Freshwater)

Description:

This habitat is defined as Maryland waters whose depth is influenced by the position of the moon (tidal) that normally range from 0 to 5 parts per thousand salinity. It includes more than 1000 miles of tidally influenced streams, as well as a significant portion of the Potomac River, the Susquehanna River below Conowingo Dam, and a section of every other tributary of size that enters Chesapeake Bay. It also includes typically small segments of tributaries that drain into the Coastal Bays section of Maryland. Bottom sediments in this key wildlife habitat vary from large boulders and outcrops of bedrock near the limit of tidal influence (few instances) to sands, silts and clays that often form relatively hard bottom. Water depths in this zone range from 0 to over 30 meters, with the shallowest areas exposed to air at low tide. Critical features created by plants and animals include submerged aquatic vegetation (SAV) beds in shallow, lower velocity areas and American oyster beds in salinities approaching 5 ppt. Because of the relatively shallow water, the input of nutrients, and frequent flushing from tide changes, primary productivity in this habitat is among the richest in the world, and there is an intimate connection between tidal wetlands and nearby waters. Its position in the watershed makes this habitat a critical link between fresh and estuarine waters. This interface is likely an important area for nutrient cycling, however, this habitat is poorly monitored and understood. The tidal fresh/oligohaline habitat is also critical spawning and larval nursery habitat for both anadromous fish species and their prey.

The location of oligohaline estuaries varies with local geography, tidal stage, weather patterns (e.g., rainfall amounts, drought), season and year. The dynamic nature of the habitat shifts its distribution and abundance at any given time, allowing it to shift over various substrates and water depths. Water depths are generally shallow, from intertidal to tens of feet. The spatial extent of low salinity estuaries increases with large rainfall events (e.g., hurricanes) but may be restricted far upriver in tributaries during low-flow or drought years.

Subtidal benthic habitats of low-salinity estuaries may include SAV beds and unvegetated mud, silt and/or sandy bottoms. Plant life may consist of SAV and macroalgae, with characteristic species including redhead grass, slender pondweed, naiads, sago pondweed, horned pondweed, wild celery, water stargrass and muskgrass. Exotic species such as curly pondweed, spiny naiad, hydrilla and Eurasian watermilfoil may also be present. The

distribution and abundance of flora varies with water clarity, nutrient loads and other factors. SAV levels are historically low in Maryland, while macroalgae levels can rise suddenly with algal blooms due to nutrient enrichment.

Location and Condition:

This habitat can be found in the upper estuaries of Chesapeake Bay, generally north of Baltimore in Kent and Harford Counties and on the Potomac River in upper Charles County south of the District of Columbia. The tidal portions of major freshwater Coastal Plain rivers are also included (Figures 4.32a and 4.32b). The Chesapeake Bay was listed as an "impaired water body" under the Clean Water Act due to excess nutrients and sediments (USGS 2004). Sources of the Bay's poor water quality include agriculture, urbanization, industry, and wastewater treatment. Pollutant loads from agricultural lands and point source nutrient loads from urban/suburban lands have generally declined due to management actions. On a pound-per-pound basis, taking into account point and nonpoint sources, urban/suburban areas deliver the most nutrient pollution to the Bay (CBP 2004a). MD DNR reported an improvement in water clarity in the upper bay area and an increase in SAV coverage and diversity, compared to the significant decline of 2003. The Potomac, however, show a significant increase in phosphorus and nitrogen concentrations. The overall water quality index still remains bellow the 40% reduction called for by the Chesapeake Bay Agreement of 2000.

In the Coastal Bays, oligohaline estuaries are limited to the upstream creeks of the coastal watershed. In comparison to the Chesapeake Bay, the Coastal Bays are in much better condition due to the higher flushing rate and the smaller and less developed watershed. However, increased nutrients (nitrogen and phosphorus) have led to poor water quality and degraded ecosystem health in the Coastal Bays. Tributaries generally show poor to very degraded water quality due to high nutrient inputs (Wazniak et al. 2004).

Figure 4.32a Location of Oligohaline Estuaries in Maryland – Average Surface Salinities, 1997-1999 (Source: MD DNR RAS; MD DNR NHP)

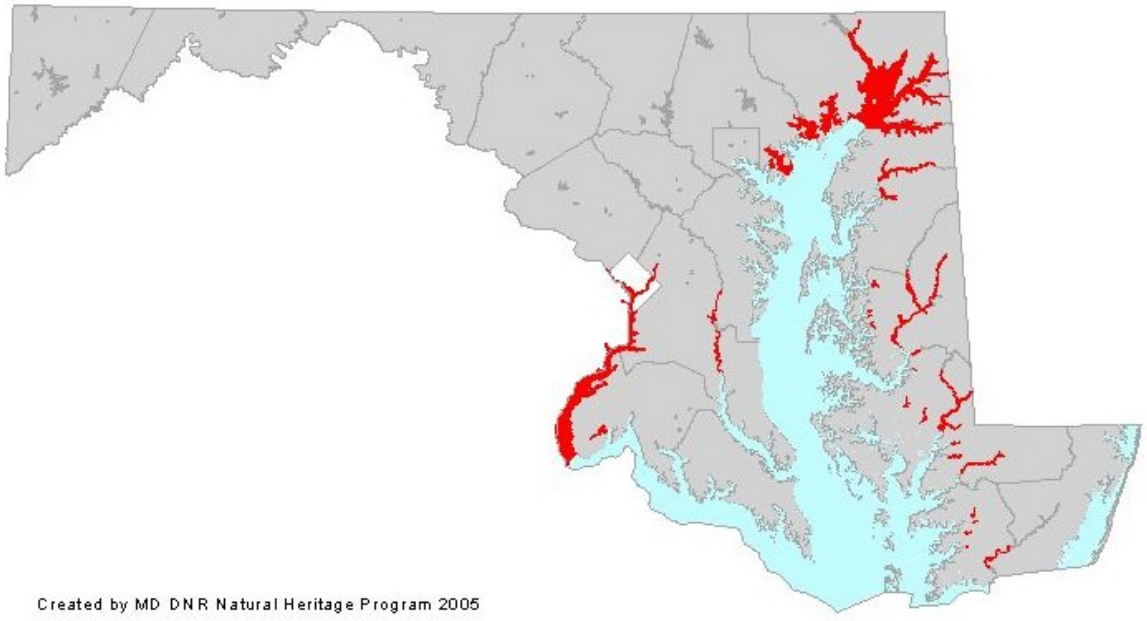
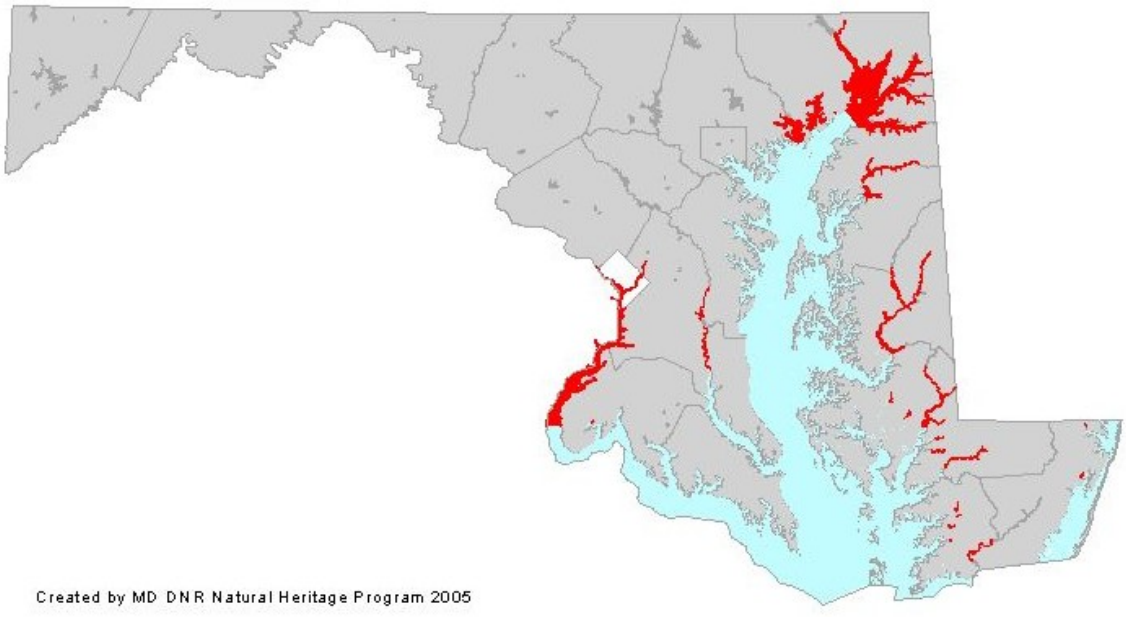


Figure 4.32b Location of Oligohaline Estuaries in Maryland – Average Bottom Salinities, 1997-1999 (Source: MD DNR RAS; MD DNR NHP)



GCN Species and Other Wildlife:

Birds
American black duck
Bald eagle
Brown pelican

Canvasback
Common loon
Common tern
Forster's tern

Horned grebe
Laughing gull
Least tern
Pied-billed grebe

Red-throated loon	**Fishes**	Longnose gar
Ruddy duck	American shad	Shortnose sturgeon
Reptiles	Atlantic sturgeon	White catfish
Northern diamond-backed terrapin	Hickory shad	

In addition to the GCN species listed above, this key wildlife habitat supports a wide diversity of wildlife species. The following game species are found in this habitat type: Canada goose, mallard, American black duck, wood duck, gadwall, blue-winged teal, green-winged teal, northern pintail, American widgeon, northern shoveler, ring-necked duck, canvasback, redhead, greater scaup, lesser scaup, bufflehead, hooded merganser, ruddy duck, eastern snapping turtle, largemouth bass, smallmouth bass, striped bass, channel catfish, white catfish, chain pickerel, American eel, white perch, yellow perch, spot, common carp, Atlantic croaker, alewife, brown bullhead, yellow bullhead, bluegill, black crappie, white crappie, and pumpkinseed. Management plans and conservation programs for these game species are currently being implemented by MD DNR, USFWS, and many other partners.

Threats:

a. Development, agriculture, and environmental contaminants that result in habitat degradation
b. Oil and chemical spills
c. Lack of scientific understanding of appropriate habitat requirements and management of all GCN species
d. Human activities & recreation that result in habitat degradation
e. Invasive non-native species (including ballast water release)
f. Pollution, including metaloids, changes in pH, and thermal and toxic discharges, nutrients (especially nitrogen and phosphorus), and sedimentation that result in water quality degradation
g. Dredge spoil dumping
h. Loss of submerged aquatic vegetation
i. Hydrologic and ground water alterations that result in changes in salinity

Conservation Actions:

a. Reestablish and conserve SAV (submerged aquatic vegetation) beds in areas where they formerly occurred and where water quality has improved since their disappearance ***[Measure: # of acres SAV restored]***

b. Develop land management plans which incorporate conservation measures into the local planning processes ***[Measure: # of local, state, and federal agency plans incorporating wildlife focused habitat management actions]***

c. Initiate measures to protect, maintain, and improve all species habitats and populations through coordinated efforts with various programs, especially the Chesapeake Bay Program ***[Measure: # of joint cooperative projects implemented]***

d. Implement BMPs to reduce non-point source impacts and erosion control measures and promote the protection and preservation/restoration of aquatic/riparian communities ***[Measure: # of projects implementing BMPs]***

e. Utilize Coastal Zone Management programs ***[Measure: # of local, state, and federal agency programs incorporating wildlife focused habitat management actions]***

f. **Improve water quality by reducing deleterious contaminant concentrations and upgrading wastewater treatment plants** ***[Measure: # of guidelines and protocols developed; # of sites with protocols implemented]***
g. Maintain buffer zones to block siltation, pesticide, and fertilizer runoff to wetlands and develop regional strategies to reduce and restrict the flow of pesticides and other toxic contaminants into aquatic systems *[Measure: # of acres of buffers protected]*
h. Coordinate conservation efforts between various interest groups and across states boundaries, including state agencies *[Measure: # of joint cooperative projects implemented]*
i. Improve and promote education and public outreach efforts *[Measure: # of educational materials developed and disseminated]*
j. Develop watershed management plans that review the totality of inputs and outputs of aquatic systems to preserve ecosystem functions *[Measure: # of plans incorporating input/output model and recommended guidelines]*
k. Develop and implement protocols to control invasive species *[Measure: # of protocols developed; # of sites with management implemented]*
l. Establish policies that reduce oil spill likelihood (e.g., vessel mandates) *[Measure: # of policies developed and implemented]*
m. Utilize the Chesapeake Bay Critical Area Program *[Measure: # of local, state, and federal agency programs incorporating wildlife focused habitat management actions]*
n. Work with NGOs, including Chesapeake Bay Foundation and the Alliance for the Chesapeake Bay *[Measure: # of joint cooperative projects implemented]*
o. Implement compatible shore-erosion techniques *[Measure: # of sites with compatible techniques implemented]*
p. Increase the number of pumpout stations *[Measure: # of pumpout stations added]*
q. Respond to oil and chemical spills quickly and effectively *[Measure: # of protocols developed and evaluated for effectiveness; # of immediate responses]*
r. Limit boating activity to protect SAV beds *[Measure: # of sites with limited access]*
s. Encourage citizens to donate to the Chesapeake Bay and Endangered Species Fund *[Measure: # of educational materials developed and distributed]*

Inventory, Monitoring and Research Needs:

a. Conduct quantitative surveys identifying all populations, habitats, and critical resources, followed by long-term research on population trends and assessments of mortality factors *[Measure: # of surveys completed]*
b. Establish coordinated habitat and population monitoring programs on a regional level using standardized surveying techniques designed to have minimal impacts on populations *[Measure: # of monitoring programs established; # of standardized protocols developed and implemented; # of conservation partners implementing standardized protocols]*
c. Develop monitoring programs to accompany all management activities for the purpose of assessing effectiveness of techniques *[Measure: # of monitoring programs established; # of monitoring programs conducted]*
d. Monitor effects of environmental contaminants *[Measure: # of monitoring studies conducted]*
e. Identify sources of aquatic contaminants and reduce their presence *[Measure: # sources identified; # of mitigation protocols developed and implemented]*
f. Conduct research on movements, mortality rates, causes of mortality, and feeding habitat of GCN species *[Measure: # of research projects conducted; # of research papers published]*
g. Conduct quantitative surveys on distribution, demographics, recruitment, and reproductive ecology, thoroughly document known populations of GCN species *[Measure: # of surveys conducted]*

h. Implement research recommendations in approved fishery management plans *[Measure: # of research projects conducted; # of research papers published]*
i. Conduct monitoring of benthic invertebrates *[Measure: # of monitoring programs established; # of monitoring programs conducted]*

(33) Mesohaline Estuaries

Description:

This habitat is defined as Chesapeake Bay and Coastal Bays tidal waters that normally range from 5 to 18 parts per thousand salinity. It includes a significant portion of the mainstem Chesapeake Bay, the lower Potomac River, eastern shore embayments, and much of the Maryland Coastal Bays area. Bottom sediments in this key wildlife habitat typically vary from hard-packed sands and clays to soft, mayonnaise-like silt in the deepest areas. Gravel beds do exist, however, in some well-flushed shallow areas. Critical shallow water features created by plants and animals include submerged aquatic vegetation (SAV) beds and American oyster beds. Because of the connection with upstream, high productivity habitat, animal and plant biomass is quite high. In addition, juvenile anadromous fish, summer migrants (e.g., weakfish, menhaden, bluefish), and developing blue crabs move into the estuary and bring additional biomass.

The location of the mesohaline salinity range within the Chesapeake Bay varies with local geography, tidal stage, weather patterns (e.g., rainfall amounts, drought), season and year. The dynamic nature of the habitat shifts its location and abundance at any given time, allowing it to move over various substrates and water depths. The large size of Chesapeake Bay and its open connection with the Atlantic Ocean creates a large mesohaline area as compared to the smaller and significantly more enclosed Coastal Bays, where mesohaline estuaries are typically limited to creek mouths. Water depths are generally shallow, from subtidal to tens of feet.

Subtidal benthic habitats of mid-salinity estuaries may include SAV beds, clam and oyster beds, and bare mud, silt and/or sandy bottoms. Plant life may consist of SAV and macroalgae, including widgeon grass, eelgrass, sago pondweed, wild celery and sea lettuce. The distribution and abundance of flora varies with water clarity, nutrient loads and other factors.

Location and Condition:

This habitat can be found generally in the middle estuaries of Chesapeake Bay and the Coastal Bays; however, the location of these mid-salinity estuaries varies with local geography, tidal stage, weather patterns (e.g., rainfall amounts, drought), season and year. The majority of Maryland's portion of the open waters of Chesapeake Bay is mesohaline, as are most of the eastern tributary estuaries. In the Coastal Bays, mesohaline waters tend to be located at creek mouths. Chesapeake Bay is listed as an "impaired water body" due to excess nutrients and sediments (USGS 2004). The condition of the Coastal Bays varies, with

Sinepuxent and Chincoteague Bays having “good” water quality ratings, Assawoman and Isle of Wight Bays rated as “fair,” Newport Bay as “poor” and St. Martin River classified as “very poor” (Wazniak et al. 2004).

Figure 4.33a Location of Mesohaline Estuaries in Maryland – Average Surface Salinities, 1997-1999 (Source: MD DNR RAS; MD DNR NHP)

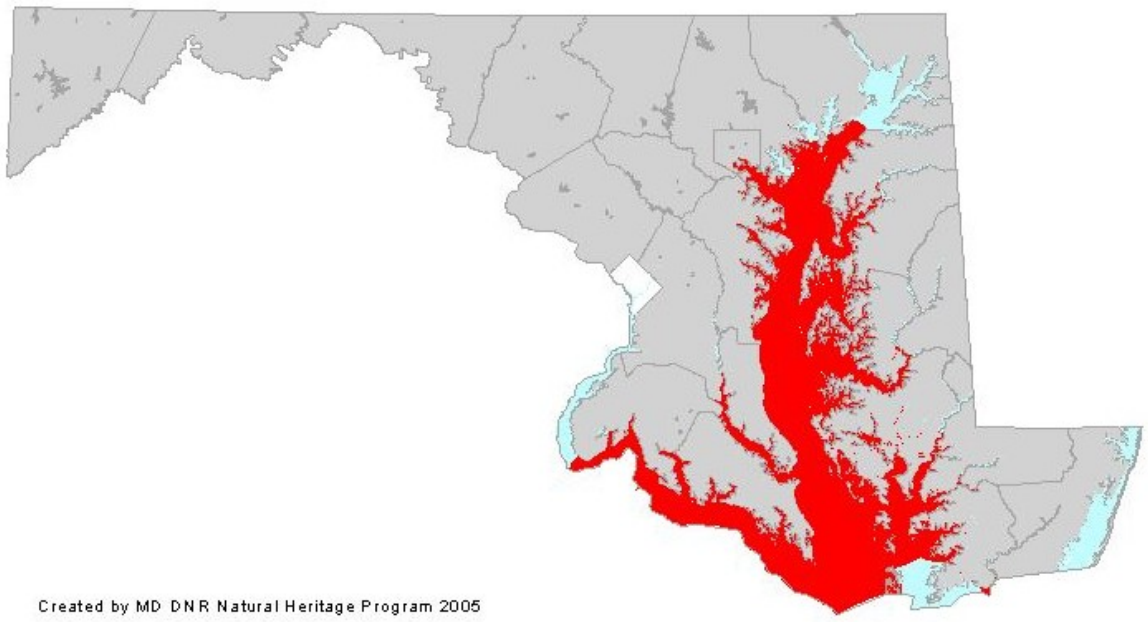
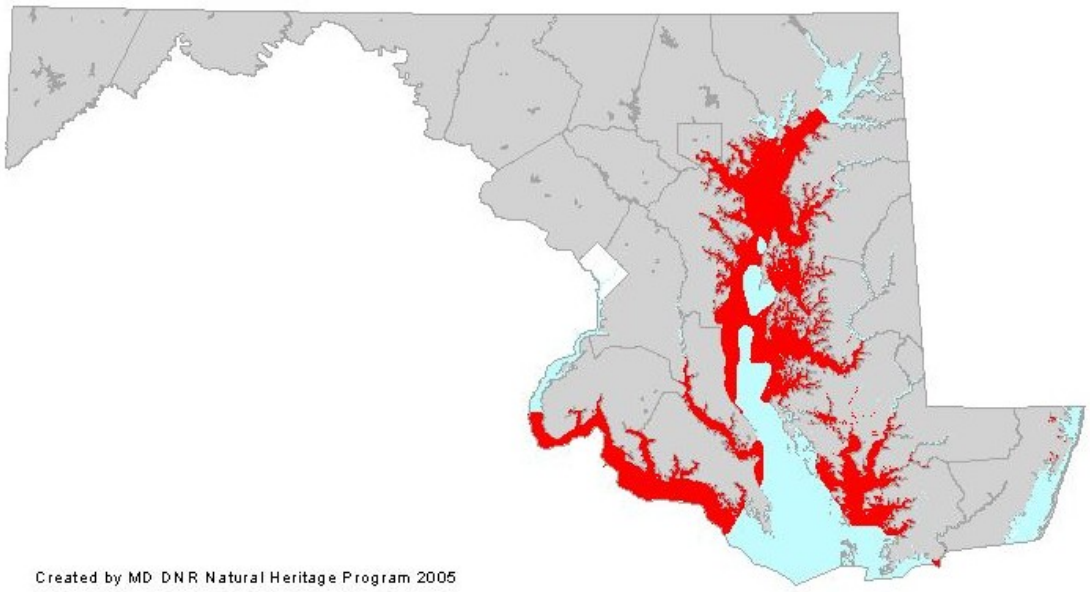


Figure 4.33b Location of Mesohaline Estuaries in Maryland – Average Bottom Salinities, 1997-1999 (Source: MD DNR RAS; MD DNR NHP)



GCN Species and Other Wildlife:

Birds
American black duck
Bald eagle
Black skimmer
Black tern
Brant
Brown pelican
Canvasback
Common loon
Common tern
Forster's tern
Gull-billed tern

Horned grebe
Laughing gull
Least tern
Northern gannet
Pied-billed grebe
Red-throated loon
Roseate tern
Royal tern
Ruddy duck
Sandwich tern
Reptiles
Atlantic hawksbill seaturtle

Green seaturtle
Kemp's ridley seaturtle
Leatherback seaturtle
Loggerhead seaturtle
Northern diamond-backed terrapin
Fishes
American shad
Atlantic sturgeon
Hickory shad
Shortnose sturgeon
Inverts: Marine Arthropods
Horseshoe crab

In addition to the GCN species listed above, this key wildlife habitat supports a wide diversity of wildlife species. The following game species are found in this habitat type: Canada goose, mallard, American black duck, wood duck, gadwall, blue-winged teal, green-winged teal, northern pintail, American widgeon, northern shoveler, ring-necked duck, canvasback, redhead, greater scaup, lesser scaup, black scoter, white-winged scoter, surf scoter, long-tailed duck, common goldeneye, bufflehead, red-breasted merganser, hooded merganser, ruddy duck, eastern snapping turtle, northern diamond-backed terrapin, striped bass, bluefish, white catfish, black drum, American eel, summer flounder, Spanish mackerel, white perch, spotted seatrout, weakfish, spot, Atlantic croaker, kingfishes, sheepshead, northern puffer, alewife, oyster toadfish, blue crab, American oyster, soft-shell clam, and razor clam. Management plans and conservation programs for these game species are currently being implemented by MD DNR, USFWS, and many other partners.

Numerous species of zooplankton and phytoplankton provide biomass to the water column and form the base of the food chain. Mesohaline estuaries are highly productive nurseries and zooplankton commonly consist of larvae of amphipods, isopods, copepods, hydromedusae, crabs, and fish (USACE 2002). Benthic fauna include blue crab, shrimp, soft shell clams, razor clams, horseshoe crabs, and oysters. Oyster reefs and shipwrecks may provide localized relief and a hard substrate for epibenthic organisms, although the abundance of oyster reefs has declined dramatically.

Seventy species of fish spend a portion of their life cycle in the mesohaline estuaries of Chesapeake Bay (USACE 2002). Some fish utilize mesohaline estuaries for spawning, while others use the habitat as juvenile nursery areas. Species such as hogchoker are resident estuarine species, but anadromous species such as herring, shad, sturgeon and striped bass are found seasonally. Menhaden, bluefish, striped bass, black drum, summer flounder, and common eel are characteristic commercially valuable species. Loggerhead seaturtles forage in the estuaries during warmer summer months and northern diamondback terrapin are resident reptiles, breeding in adjacent coastal habitats.

Mesohaline estuaries also support a high diversity of waterbirds and waterfowl. These waters provide foraging habitat for hundreds of avian species, including numerous GCN species such as common loon, horned grebe, least tern, brown pelican, and many species of herons and egrets. Bald eagle and osprey rely on near shore waters for foraging areas, as well. The estuaries are migratory staging sites for many species, such as loons, northern gannet, canvasback and Canada goose, and year-round habitat for others (e.g., American black duck). Estuaries in the lower Potomac River and the mouth of the Choptank River host thousands of migrating and overwintering waterfowl such as bufflehead, canvasback, both scaup species, and common goldeneye. Up to 50,000 waterfowl overwinter on the lower Potomac's estuaries, and over 59,000 waterfowl stopover or winter at Eastern Neck NWR in Queen Anne's County (Chipley et al. 2003).

Threats:

a. Development, agriculture, and environmental contaminants that result in habitat degradation
b. Oil and chemical spills
c. Lack of scientific understanding of appropriate habitat requirements and management of all GCN species
d. Human activities & recreation that result in habitat degradation
e. Invasive non-native species (including ballast water release)
f. Pollution, including metaloids, changes in pH, and thermal and toxic discharges, nutrients (especially nitrogen and phosphorus), and sedimentation that result in water quality degradation
g. Dredge spoil dumping
h. Loss of submerged aquatic vegetation
i. Loss of oxygen
j. Oyster reef extraction that results in habitat loss
k. Dredges and scrapes (commercial uses) that impact SAV and bottom sediments
l. Hydrologic and ground water alterations that result in changes in salinity

Conservation Actions:

a. Reestablish and conserve SAV (submerged aquatic vegetation) beds in areas where they formerly occurred and where water quality has improved since their disappearance ***[Measure: # of acres SAV restored]***

b. Develop land management plans which incorporate conservation measures into the local planning processes ***[Measure: # of local, state, and federal agency plans incorporating wildlife focused habitat management actions]***

c. Initiate measures to protect, maintain, and improve all species habitats and populations through coordinated efforts with various programs, especially the Chesapeake Bay Program ***[Measure: # of joint cooperative projects implemented]***

d. Implement BMPs to reduce non-point source impacts and erosion control measures and promote the protection and preservation/restoration of aquatic/riparian communities ***[Measure: # of projects implementing BMPs]***

e. Improve water quality by reducing deleterious contaminant concentrations and upgrading wastewater treatment plants ***[Measure: # of guidelines and protocols developed; # of sites with protocols implemented]***

f. **Utilize Coastal Zone Management programs** ***[Measure: # of local, state, and federal agency programs incorporating wildlife focused habitat management actions]***
g. Maintain buffer zones to block siltation, pesticide, and fertilizer runoff to wetlands and develop regional strategies to reduce and restrict the flow of pesticides and other toxic contaminants into aquatic systems *[Measure: # of acres of buffers protected]*
h. Develop watershed management plans that review the totality of inputs and outputs of aquatic systems to preserve ecosystem functions *[Measure: # of plans incorporating input/output model and recommended guidelines]*
i. Coordinate conservation efforts between various interest groups and across states boundaries, including state agencies *[Measure: # of joint cooperative projects implemented]*
j. Improve and promote education and public outreach efforts *[Measure: # of educational materials developed and disseminated]*
k. Develop and implement protocols to control invasive species *[Measure: # of protocols developed; # of sites with management implemented]*
l. Establish policies that reduce oil spill likelihood (e.g., vessel mandates) *[Measure: # of policies developed and implemented]*
m. Utilize the Coastal Bays Program *[Measure: # of local, state, and federal agency programs incorporating wildlife focused habitat management actions]*
n. Utilize the Chesapeake Bay Critical Area Program *[Measure: # of local, state, and federal agency programs incorporating wildlife focused habitat management actions]*
o. Work with NGOs, including Chesapeake Bay Foundation and the Alliance for the Chesapeake Bay *[Measure: # of joint cooperative projects implemented]*
p. Implement compatible shore-erosion techniques *[Measure: # of sites with compatible techniques implemented]*
q. Increase the number of pumpout stations *[Measure: # of pumpout stations added]*
r. Respond to oil and chemical spills quickly and effectively *[Measure: # of protocols developed and evaluated for effectiveness; # of immediate responses]*
s. Limit boating activity to protect SAV beds *[Measure: # of sites with limited access]*
t. Implement required management actions in approved fishery management plans *[Measure: # of actions implemented]*
u. Encourage citizens to donate to the Chesapeake Bay and Endangered Species Fund *[Measure: # of educational materials developed and distributed]*

Inventory, Monitoring and Research Needs:

a. Conduct quantitative surveys identifying all populations, habitats, and critical resources, followed by long-term research on population trends and assessments of mortality factors *[Measure: # of surveys completed]*
b. Establish coordinated habitat and population monitoring programs on a regional level using standardized surveying techniques designed to have minimal impacts on populations *[Measure: # of monitoring programs established; # of standardized protocols developed and implemented; # of conservation partners implementing standardized protocols]*
c. Develop monitoring programs to accompany all management activities for the purpose of assessing effectiveness of techniques *[Measure: # of monitoring programs established; # of monitoring programs conducted]*
d. Monitor effects of environmental contaminants *[Measure: # of monitoring studies conducted]*
e. Identify sources of aquatic contaminants and reduce their presence *[Measure: # sources identified; # of mitigation protocols developed and implemented]*
f. Conduct research on movements, mortality rates, causes of mortality, and feeding habitat of GCN species *[Measure: # of research projects conducted; # of research papers published]*

g. Determine the effects of dredging on GCN species *[Measure: # of research projects conducted; # of research papers published]*
h. Conduct quantitative surveys on distribution, demographics, recruitment, and reproductive ecology, thoroughly document known populations of GCN species *[Measure: # of surveys completed]*
i. Conduct SAV monitoring *[Measure: # of surveys completed]*
j. Implement research recommendations in approved fishery management plans *[Measure: # of research projects conducted; # of research papers published]*
k. Conduct research on abundance, distribution, and food web dynamics of important organisms to add information to ecosystem models *[Measure: # of research projects conducted; # of research papers published]*

(34) Polyhaline Estuaries

Description:

This habitat is defined as tidal waters of the Chesapeake Bay and Coastal Bays that normally range from 18 to 30 parts per thousand salinity. Bottom sediments in this key wildlife habitat typically vary from hard-packed sands and clays to soft, mayonnaise-like silt in the deeper troughs. Depths in this habitat range from tidally exposed to more than 40 meters. Critical shallow water features created by plants and animals include submerged aquatic vegetation (SAV) beds and American oyster beds. Because of the connection with the upper estuary zones, animal and plant biomass is quite high. In addition, juvenile anadromous fish, summer migrants (e.g., weakfish, menhaden, bluefish), and developing blue crabs move into the estuary and bring additional biomass.

The location of the polyhaline salinity range within the Chesapeake Bay varies with local geography, tidal stage, weather patterns (e.g., rainfall amounts, drought), season and year. The dynamic nature of the habitat shifts its location and abundance at any given time, allowing it to move over various substrates and water depths. High salinity estuaries generally are found in the lower portion of estuaries, closest to marine waters.

Subtidal benthic habitats of polyhaline estuaries may include SAV beds, clam and oyster beds, and unvegetated mud, silt and/or sandy bottoms. Plant life may consist of SAV and macroalgae (seaweed), with widgeon grass, eelgrass, and sea lettuce as characteristic species. The distribution and abundance of flora varies with water clarity, nutrient loads and other factors.

Location and Condition:

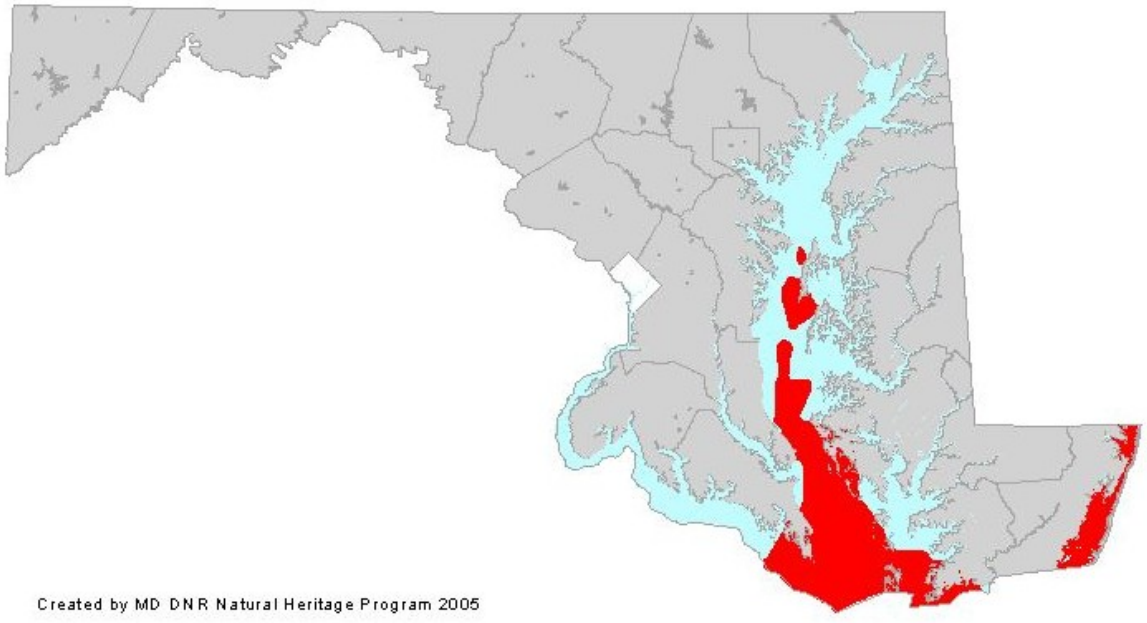
This habitat can be found in the lower estuaries and open waters of Chesapeake Bay and the Coastal Bays. The location of polyhaline estuaries varies with local geography, tidal stage, weather patterns (e.g., rainfall amounts, drought), season and year. At the surface, typical polyhaline distribution in Chesapeake Bay is limited to Virginia, with only occasional extension into the open waters of Maryland. Polyhaline distribution at the bottom of the Chesapeake Bay extends much farther northward (Figures 4.34a and 4.34b). The Chesapeake Bay was listed as an "impaired water body" under the Clean Water Act due to excess nutrients and sediments (USGS 2004).

The open coastal bays have good to excellent condition compared to Chesapeake Bay (Wazniak et al. 2004). Sinepuxent and Chincoteague Bays have a "good " overall water quality index ranking of .85 and .74, due to lack of development and regular flushing. Isle of

Wight and Assawoman Bays have "fair" conditions with ranks of .53 and .33, while Newport Bay and St. Martin River have the "poor" rankings of .35 and .33 due to very low values for water quality, living resources, and habitat indicators.

Figure 4.34a Location of Polyhaline Estuaries in Maryland – Average Surface Salinities, 1997-1999 (Source: MD DNR RAS; MD DNR NHP)

Figure 4.34b Location of Polyhaline Estuaries in Maryland – Average Bottom Salinities, 1997-1999 (Source: MD DNR RAS; MD DNR NHP)



GCN Species and Other Wildlife:

Mammals
Humpback whale
Birds
American black duck
Bald eagle
Black skimmer
Black tern
Brant
Brown pelican
Canvasback
Common loon
Common tern
Forster's tern

Gull-billed tern
Horned grebe
Laughing gull
Least tern
Northern gannet
Red-throated loon
Roseate tern
Royal tern
Ruddy duck
Sandwich tern
Reptiles
Atlantic hawksbill seaturtle
Green seaturtle

Kemp's ridley seaturtle
Leatherback seaturtle
Loggerhead seaturtle
Northern diamond-backed terrapin
Fishes
American shad
Atlantic sturgeon
Hickory shad
Shortnose sturgeon
Inverts: Marine Arthropods
Horseshoe crab

In addition to the GCN species listed above, this key wildlife habitat supports a wide diversity of wildlife species. The following game species are found in this habitat type: Canada goose, snow goose, brant, mallard, American black duck, wood duck, gadwall, blue-winged teal, green-winged teal, northern pintail, American widgeon, northern shoveler, ring-necked duck, canvasback, redhead, greater scaup, lesser scaup, black scoter, white-winged scoter, surf scoter, long-tailed duck, common goldeneye, bufflehead, red-breasted merganser, hooded merganser, eastern snapping turtle, northern diamond-backed terrapin, black sea bass, striped bass, bluefish, black drum, American eel, summer flounder, Spanish mackerel, scup, spotted seatrout, tautog, weakfish, spot, hickory shad, Atlantic croaker, kingfishes, Florida pompano, sheepshead, northern puffer, cunner, alewife, oyster toadfish, pollock, hake, king mackerel, spiny dogfish, smooth dogfish, gray triggerfish, blue crab, American oyster, hardshell clam, and razor clam. Management plans and conservation programs for these game species are currently being implemented by MD DNR, USFWS, and many other partners.

The Coastal Bays support over 140 species of finfish and 120 species of benthic and epibenthic invertebrates (Wazniak et al. 2004). Estuarine-dependent species such as summer flounder, bluefish, spot, weakfish, tautog, and black sea bass are commercially valuable, while recreational anglers target croaker and striped bass in addition to many of the commercially valuable species.

Polyhaline estuaries also support a high diversity of waterbirds and waterfowl. These waters provide foraging habitat for many avian species, including numerous GCN species such as least tern, black skimmer, brown pelican, and many species of herons and egrets. The estuaries are overwintering and migratory staging sites for species, such as loons, grebes, and brant, and year-round habitat for others (e.g., American black duck).

Threats:

a. Development, agriculture, and environmental contaminants that result in habitat degradation
b. Oil and chemical spills
c. Lack of scientific understanding of appropriate habitat requirements and management of all GCN species
d. Human activities & recreation that result in habitat degradation
e. Invasive non-native species (including ballast water release)
f. Pollution, including metaloids, changes in pH, and thermal and toxic discharges, nutrients (especially nitrogen and phosphorus), and sedimentation that result in water quality degradation
g. Dredge spoil dumping
h. Loss of submerged aquatic vegetation
i. Loss of oxygen
j. Oyster reef extraction that results in habitat loss
k. Dredges and scrapes (commercial uses) that impact SAV and bottom sediments
l. Hydrologic and ground water alterations that result in changes in salinity

Conservation Actions:

a. Initiate measures to protect, maintain, and improve all species habitats and populations through coordinated efforts with various programs, especially the Chesapeake Bay Program ***[Measure: # of joint cooperative projects implemented]***

b. Develop land management plans which incorporate conservation measures into the local planning processes ***[Measure: # of local, state, and federal agency plans incorporating wildlife focused habitat management actions]***

c. Implement BMPs to reduce non-point source impacts and erosion control measures and promote the protection and preservation/restoration of aquatic/riparian communities ***[Measure: # of projects implementing BMPs]***

d. Reestablish and conserve SAV (submerged aquatic vegetation) beds in areas where they formerly occurred and where water quality has improved since their disappearance ***[Measure: # of acres SAV restored]***

e. Improve water quality by reducing deleterious contaminant concentrations and upgrading wastewater treatment plants ***[Measure: # of guidelines and protocols developed; # of sites with protocols implemented]***

f. Utilize Coastal Zone Management programs ***[Measure: # of local, state, and federal agency programs incorporating wildlife focused habitat management actions]***

g. Utilize the Coastal Bays Program ***[Measure: # of local, state, and federal agency programs incorporating wildlife focused habitat management actions]***

h. Maintain buffer zones to reduce siltation, pesticide, and fertilizer runoff to wetlands and develop regional strategies to reduce and restrict the flow of pesticides and other toxic contaminants into aquatic systems *[Measure: # of acres of buffers protected]*

i. Coordinate conservation efforts between various interest groups and across states boundaries, including state agencies *[Measure: # of joint cooperative projects implemented]*

j. Improve and promote education and public outreach efforts *[Measure: # of educational materials developed and disseminated]*

k. Develop watershed management plans that review the totality of inputs and outputs of aquatic systems to preserve ecosystem functions *[Measure: # of plans incorporating input/output model and recommended guidelines]*

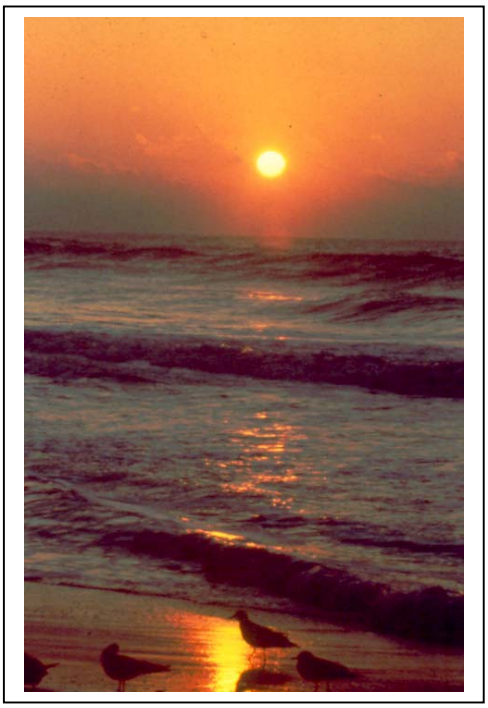
l. Develop and implement protocols to control invasive species *[Measure: # of protocols developed; # of sites with management implemented]*
m. Establish policies that reduce oil spill likelihood (e.g., vessel mandates) *[Measure: # of policies developed and implemented]*
n. Utilize the Chesapeake Bay Critical Area Program *[Measure: # of local, state, and federal agency programs incorporating wildlife focused habitat management actions]*
o. Work with NGOs, including Chesapeake Bay Foundation and the Alliance for the Chesapeake Bay *[Measure: # of joint cooperative projects implemented]*
p. Implement compatible shore-erosion control techniques *[Measure: # of sites with compatible techniques implemented]*
q. Increase the number of pumpout stations *[Measure: # of pumpout stations added]*
r. Respond to oil and chemical spills quickly and effectively *[Measure: # of protocols developed and evaluated for effectiveness; # of immediate responses]*
s. Limit boating activity to protect SAV beds *[Measure: # of sites with limited access]*
v. Implement required management actions in approved fishery management plans *[Measure: # of actions implemented]*
t. Encourage citizens to donate to the Chesapeake Bay and Endangered Species Fund *[Measure: # of educational materials developed and distributed]*

Inventory, Monitoring and Research Needs:

a. Conduct quantitative surveys identifying all populations, habitats, and critical resources, followed by long-term research on population trends and assessments of mortality factors *[Measure: # of surveys completed]*
b. Establish coordinated habitat and population monitoring programs on a regional level using standardized surveying techniques designed to have minimal impacts on populations *[Measure: # of monitoring programs established; # of standardized protocols developed and implemented; # of conservation partners implementing standardized protocols]*
c. Develop monitoring programs to accompany all management activities for the purpose of assessing effectiveness of techniques *[Measure: # of monitoring programs established]*
d. Monitor effects of environmental contaminants *[Measure: # of monitoring studies conducted]*
e. Identify sources of aquatic contaminants and reduce their presence *[Measure: # sources identified; # of mitigation protocols developed and implemented]*
f. Conduct research on movements, mortality rates, causes of mortality, and feeding habitat of GCN species *[Measure: # of research projects conducted; # of research papers published]*
g. Determine the effects of dredging on GCN species *[Measure: # of research projects conducted; # of research papers published]*
h. Conduct quantitative surveys on distribution, demographics, recruitment, and reproductive ecology, thoroughly document known populations of GCN species *[Measure: # of surveys completed]*
i. Conduct SAV monitoring *[Measure: # of surveys completed]*
l. Implement research recommendations in approved fishery management plans *[Measure: # of research projects conducted; # of research papers published]*
j. Conduct research on abundance, distribution, and food web dynamics of important organisms to add information to ecosystem models *[Measure: # of research projects conducted; # of research papers published]*

(35) Ocean

Description:



The Atlantic Ocean consists of benthic, pelagic and surface water habitats. This community is defined as open marine waters (salinity exceeding 30 ppt) and includes all substrate types: unconsolidated sands, muds and gravels; rock; reef; and aquatic beds (Cowardin et al. 1979). Water depths range from zero at the coastline to thousands of feet in international waters; Maryland's marine waters are less than seventy feet deep, however. Bottom topography is generally gently sloping away from the shoreline, with occasional shoals, sand waves or shipwrecks providing local topography.

Marine habitats are typically high energy, with waves and currents mixing waters of varying temperatures, salinities and nutrient levels. Lunar tides alter the water levels in the nearshore region and generate currents at inlets, where marine waters are diluted with estuarine waters. Longshore currents transport sediment and zooplankton along nearshore margins, creating a dynamic habitat that is continually changing. Along the Mid-Atlantic coast, open ocean vegetative associations are limited to phytoplankton and macroalgae.

Location and Condition:

Oceanic habitat is found from the shorelines of Fenwick Island and Assateague Island seaward for three miles (the jurisdiction for state waters), covering approximately 96 square miles. No oceanic waters are impaired and there is only one point source of pollution: the wastewater discharge for Ocean City (MD DNR 2000b).

However, of Maryland's 35 key wildlife habitats, this one is least likely to afford significant conservation of the species found within it through conservation of the habitat. Most species are highly migratory and conservation of oceanic species is best achieved through better regulation of commercial and recreational fisheries at the state, national and international levels.

Figure 4.35 Location of Ocean in Maryland (Source: MD DNR NHP)

GCN Species and Other Wildlife:

Mammals
Blue whale
Fin whale
Harbor porpoise
Humpback whale
Northern right whale
Sei whale
Sperm whale
Birds
Black skimmer
Black tern
Brant
Brown pelican

Common loon
Common tern
Forster's tern
Harlequin duck
Horned grebe
Laughing gull
Least tern
Northern gannet
Red-throated loon
Roseate tern
Royal tern
Sandwich tern
Reptiles

Atlantic hawksbill seaturtle
Green seaturtle
Kemp's ridley seaturtle
Leatherback seaturtle
Loggerhead seaturtle
Fishes
American shad
Atlantic sturgeon
Hickory shad
Shortnose sturgeon
Inverts: Marine Arthropods
Horseshoe crab

In addition to the GCN species listed above, this key wildlife habitat supports a wide diversity of wildlife species. The following game species are found in this habitat type: brant, common eider, king eider, black scoter, white-winged scoter, surf scoter, long-tailed duck, common goldeneye, red-breasted merganser, black sea bass, striped bass, bluefish, black drum, American eel, summer flounder, Spanish mackerel, scup, spotted seatrout, tautog, weakfish, Atlantic croaker, kingfishes, Florida pompano, northern puffer, cunner, alewife, pollock, hake, king mackerel, spiny dogfish, smooth dogfish, gray triggerfish,

dolphin, white marlin, wahoo, albacore, bluefin tuna, skipjack tuna, blue shark, dusky shark, requiem shark, shortfin mako, yellowfin tuna, blue crab, and American lobster. Management plans and conservation programs for these game species are currently being implemented by MD DNR, USFWS, and many other partners.

The water column hosts a high number of pelagic species, some of which are resident (e.g.,flounder) while others are migratory and are found only seasonally (e.g., whales, tuna, sharks). Commercially and recreationally valuable fisheries also contribute to the biodiversity of marine waters; Spanish mackerel, scup, spiny dogfish, bluefin tuna, monkfish, swordfish, Atlantic blue and white marlin, and Atlantic sailfish all attract commercial fishermen and anglers to Maryland's coast.

The ocean provides foraging habitat for many seabirds and waterfowl such as red-throated loon, northern gannet, shearwaters, storm-petrels, alcids, scoters, gulls, and terns.

Benthic fauna found in Maryland's marine waters are diverse – from worms and mollusks to crustaceans and bottom-dwelling fish. Channel whelk, lightning whelk, knobbed whelk, and horseshoe crabs are predators on other benthic organisms.

Threats:

a. Development and environmental contaminants that result in habitat degradation
b. Dredges and scrapes (commercial uses) that impact bottom sediments
c. Oil and chemical spills
d. Lack of scientific understanding of appropriate habitat requirements and management of all GCN species
e. Human activities & excessive recreational use that results in habitat degradation
f. Invasive non-native species (including ballast water release)
g. Acoustic disturbance
h. Sand mining

Conservation Actions:

a. Reduce recreational impacts by educating the public about these impacts and ways to minimize them ***[Measure: # of educational materials developed and distributed]***

b. Reduce presence of aquatic contaminants ***[Measure: # of guidelines developed; # of guidelines implemented]***

c. Establish policies that reduce oil spill likelihood (e.g., vessel mandates) ***[Measure: # of policies developed and implemented]***

d. Develop land management plans which incorporate conservation measures into the local planning processes *[Measure: # of local, state, and federal agency plans incorporating wildlife focused habitat management actions]*

e. Implement recommendations in the 2005 Maryland Coastal Bays Management Plan *[Measure: # of recommendations implemented]*

f. Implement required management actions in approved fishery management plans *[Measure: # of actions implemented]*

g. Coordinate conservation efforts between various interest groups and across states boundaries, including state agencies *[Measure: # of joint cooperative projects implemented]*

h. Improve and promote education and public outreach efforts *[Measure: # of educational materials developed and disseminated]*

i. Ensure sand mining activity is limited to areas of least impact *[Measure: # of sites identified and protected from sand mining activities]*
j. Respond to oil and chemical spills quickly and effectively *[Measure: # of protocols developed and evaluated for effectiveness; # of immediate responses]*
k. Develop and implement protocols to control invasive species *[Measure: # of protocols developed; # of sites with management implemented]*

Inventory, Monitoring and Research Needs:

a. Identify sources of aquatic contaminants *[Measure: # of sources identified]*
b. Determine indicators of ecologically significant areas *[Measure: # of research studies conducted; # of research papers published; # of indicators identified]*
c. Conduct long-term monitoring program for priority GCN species and/or indicators of ecologically significant areas *[Measure: # of monitoring programs developed; # of monitoring programs conducted]*
d. Conduct research to define predator-prey interactions and ecosystem relationships among organisms within this habitat *[Measure: # of research studies conducted; # of research papers published; # of indicators identified]*